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ECONOMIC AND SOCIAL DEVELOPMENT NEEDS IN THE MINERAL SECTOR: SMALL-SCALE MINING ACTIVITIES IN DEVELOPING COUNTRIES AND ECONOMIES IN TRANSITION

Small-scale mining activities in developing countries and economies in transition

Report of the Secretary-General

SUMMARY

The present report has been prepared in response to Economic and Social Council decision 1993/302. The report acknowledges the positive and dynamic economic role of the small-scale mining sector and addresses the social and environmental impacts related to legislation and regulations, and mechanized operations, with special attention to the role and contribution of women. This concern arises due to the propensity for illegality in small-scale mining, which is increasingly a problem for developing countries and economies in transition.

A major reason for illegal activities in small-scale mining is the poverty associated with rural populations in developing countries. This is exacerbated by the lack of alternative employment opportunities, the failure to provide education and training, and the need to maintain a subsistence income.

* E/C.7/1994/1.

The environmental impacts of small-scale mining tend to create major health, safety and social problems. This report discusses the requirements for an effective legislative/regulatory regime, as well as the approach being taken by the United Nations in the areas of environmental management and reclamation. It concludes that Governments will need to assume a greater "hands on" role in the small-scale mining sector, especially with regard to financial assistance, training and environmental protection and reclamation.

In all mining, whether it be on a large or a small scale, the health and safety factors affecting the working conditions of the miners are of paramount importance. This report outlines the problems and solutions required to address these major issues.

In response to the interest expressed about the role of women in mining, the present report discusses the position of women in the small-scale mining sector, and includes a section on the United Nations Conference on Environment and Development and its proposals regarding women and the environment.

The problems arising from small-scale mining could be alleviated with regional, national and international cooperation. The United Nations is already playing a role in assisting developing countries and economies in transition in two ways - through the dissemination of information and the initiation of specific projects. Governments are increasingly concerned about, and are making concerted efforts oriented towards, organizing small-scale mining into a legal and formal sector, thus ensuring that resources are exploited sensibly and that full economic benefits are realized.

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INTRODUCTION

1. The present report has been prepared in accordance with Economic and Social Council decision 1993/302, and the recommendation made by the Committee on Natural Resources at its first session 1/ that the Secretary-General be requested by the Council to prepare for the second session of the Committee a report on small-scale mining addressing activities in developing countries and economies in transition, including social and environmental impacts, national legislation regarding enterprises in this area, and mechanized operations, with special attention to the role and contribution of women miners.

2. During the 1970s, efforts were mainly directed towards large-scale mining development, usually involving State ownership. The situation changed drastically as a result of the economic downturn of the 1980s, which increased the economic viability of small-scale mining. While the production from small mines impacts marginally on the world mineral market, it has a significant impact on national and regional economies. Such mining does have the potential, in many cases, of becoming medium-scale and large-scale based on increased potential ore reserves and their geographical location.

3. The international community, as well as Governments, is looking with new interest at developing the domestic private sector (formal and informal), and has recognized that job creation can be accelerated if the formal private sector flourishes. At the beginning of the 1990s, the informal sector assumed an increasing economic welfare-related function in developing countries, as well as in economies in transition.

4. In February 1993, the participants at the International Seminar on Guidelines for the Development of Small- and Medium-Scale Mining (organized by the United Nations in collaboration with the Government of Zimbabwe and Small-Scale Mining International, a non-governmental organization, and held at Harare) drafted guidelines on legal, fiscal and financial aspects; technical, environmental and social aspects; and marketing, investment and government support measures. Those Guidelines as well as the conclusions reached by the over 150 participants from 35 countries and institutions were provided to the Committee on Natural Resources at the first session. The Seminar affirmed:

(a) That the potential benefits of small-scale mining outweigh its negative characteristics and Governments should harness rather than hamper its vigour;

(b) That small-scale mining is an entrepreneurship and is amenable to upscaling, including the formalizing of illegal or informal mining. Adequate conditions for orderly growth in this sector should be created by Governments;

(c) That minerals are a valuable resource which should not be wasted and environmental protection and measures should not be considered a luxury but rather an integral part of the exploitation of mineral resources;

(d) That equipment needed in the small/medium-scale mining sector could easily be manufactured in developing countries.

5. The present report attempts to bring together some of the accumulated experience, information and proposed initiatives emerging in response to the recommendation made by the Committee on Natural Resources at its first session. The International Labour Organization (ILO) has provided a main contribution to section IV of this report.

I. ENVIRONMENTAL AND SOCIAL IMPACTS OF SMALL-SCALE MINING IN SELECTED REGIONS

6. The impact of small-scale mining in selected regions is illustrated by examples from Brazil and India. The importance of government support is demonstrated through the results obtained in these two different but very important countries. Both will have increasingly important impacts in the world because of economic, environmental and population considerations.

A. Alluvial gold-mining in the Amazon, Brazil

7. Garimpos (small-scale informal mining sites (alluvial/primary/colluvial)), which cause substantial environmental damage, occur at about 2,000 different locations in Brazil. Approximately half of them are concentrated in the central Amazon region, mostly along river systems. Two important garimpo areas are the Tapajós region in the State of Maranhão and Poconé in the Mato Grosso. However, in the Tapajós region, the number of active garimpos is now reduced compared with that in the early 1980s, as a result of harsh working conditions, and lower gold prices, combined with a higher cost of mining and fuel products, thus making it more difficult to earn a living wage.

8. Garimpeiros (small-scale/artisanal informal miners) have little, if any, formal schooling and have no tradition of cooperative work. Having no other options, they mine, because mining is the only way to earn income. Thus, their activities are based on short-term gain rather than long-term economic viability. They are basically divided into two socially and economically uneven groups, the garimpo owner and the workers, with the garimpo owners earning profit primarily by providing services to the miners. The majority of garimpeiros come from rural regions where they were generally deprived of land. In 1993, their average salary, equivalent to four national minimum salaries, was just under US$ 250. They tend to invest their meagre savings in ranching, thereby further exacerbating deforestation, rather than in mining development by improving mining methods and machinery. In the mid-1980s, some investment went into dredging which provided a quick but unsustainable bounty. Investment was directed primarily towards mining service and supply, small commercial business and ranching.

9. The environmental damage caused by garimpagem (small-scale mining) is quite visible and very well documented. It will continue as long as no economic alternatives to this gold-rush-type mining are created. One environmental problem associated with informal mining stems from the use and release of mercury, used for gold recovery by amalgamation. The resulting contamination affects the food chain, and causes health problems for all living creatures. A second problem arising from these activities is the river-bank destruction

caused by the movement of millions of tons of gravel, sand and soil gouged by the miners' activities. Rivers carry sediments hundreds of kilometres, thus affecting downstream activities and contributing to the spread of malaria. Last but not least, garimpagem exacerbates deforestation and loss of indigenous habitat and intensifies the spread of malaria to the Indian population. In addition, the fact must be considered that on the part of the miners there is neither a capability of nor an interest in addressing the issues of the environmental impact of such illegal mining.

10. The environmental impact of garimpeiro mining raises several issues:

(a) Whether garimpeiro gold-mining can be environmentally acceptable;

(b) Whether profit from mining is worth the environmental degradation it causes;

(c) Whether the income from the mining activities is sufficient to fund monitoring/inspection and rehabilitation.

11. Any Government should consider these issues in the framework of its sustainable development policies. While there are no clear-cut answers, Governments should encourage activities that will generate minimum environmental disturbance. The formulation of a project to mitigate the negative impact of garimpagem on the Amazonian ecosystem must integrate sectoral and cross-sectoral objectives. Therefore, assistance to the garimpeiro should be appended to a broader effort whereby issues such as land-use planning, economic zoning, and natural resources assessment programmes are addressed. Simultaneously, the identification of alternative small-scale economic ventures must benefit from experience reached elsewhere in Brazil or in other sensitive ecosystems in the world. Economic viability, market cycles and the entrepreneurial needs of small-scale enterprises should be assessed. Loans at preferential (non-commercial) rates should be made available to foster entrepreneurship. The garimpeiros have played and are able to go on playing a valuable role in economic development through prospecting frontier areas and doing so inexpensively.

12. The best option for the Amazonian States would consist in the authorities making provision for alternative development as well as enacting policies capable of stimulating formal mining in the region. To this end, a phased approach is required integrating biodiversity, logging, ranching, afforestation and social development. Mining costs can be reduced by recycling mercury and upgrading mining technologies and methodologies. Also, health issues such as the malaria epidemic, which is the garimpeiro's main concern, must be faced.

13. The Government is contemplating general options for the Tapajós area. Included in these are (a) legalization of the garimpeiro mining activities including a titles system; (b) introduction of adequate mining and processing techniques, economic evaluation of mineral deposits and districts, introduction of equipment to mechanize mining activities, land reclamation, better infrastructure, and training; (c) health and safety measures including a programme of identifying the health and social needs of the garimpeiro families in order to inform national and international assistance agencies involved in

the problem; and (d) environmental control and training in mitigating and eliminating the use of mercury. Techniques such as cyanidation will have to be used. Cyanidation requires more extensive chemical and physical treatment of the ore and experience with this technique is already available worldwide. It is estimated that a budget of US$ 21.5 million is required in order to undertake these measures over a three-year period. Because of the complexity of the problem and the cost of mitigating it, implementation of these measures has been slow. The problem would be addressed more quickly if international agencies and funding institutions were involved in a more holistic fashion.

B. Industrial minerals exploitation and gemstone mining in India

1. Industrial minerals exploitation in West Bengal

14. In the district of Birbhum, West Bengal State, India, a project was implemented by the state government to create an independent autonomous enterprise that would mine stone materials for construction activities. Birbhum is a district where poverty and unemployment are particularly acute. The demand for stone materials, combined with a low capital investment in Calcutta and the Asansol-Durgapur industrial belt, offers an excellent opportunity for the alleviation of poverty.

15. In the period 1972-1973, the state Government of Birbhum decided to exploit an extensive stone deposit to stimulate employment. It formed a State Mineral Development Corporation (SMDC) and recruited workers as entrepreneurs for labour-intensive, small-scale, low-cost operations, using a semi-mechanized medium-scale technological operation for the entrepreneurs to emulate. The State Corporation helped in training under actual operating conditions, and generated confidence among locals, thus encouraging them to go into private ventures. It also assisted with further mineral-based industrial development using appropriate technology suited to local conditions. The entrepreneurs were chosen on the basis of initiative, drive, seriousness, experience, and particularly determination to complete the initial 4-5 years of mining development. Experienced young men from outside the area were also hired to help train local miners in actual exploitation, processing and marketing. The State Corporation bought the entire production of the entrepreneurs, made prompt cash payment, and took responsibility for marketing the produce. This left the small entrepreneurs free from financial anxieties and able to fully dedicate themselves to mining activities. The State Corporation paid royalties to the state Government for the materials that were exported from the local area.

16. The State Corporation arranged small loans for initial operations and purchases with different banks and financial institutions. It also provided some working capital. The initial investment was about US$ 160 per person employed, compared with an amount ranging from US$ 3,200 to US$ 320,000 in any modern industrial enterprise. In order to develop markets, the stone materials were tested in government laboratories for use as road aggregates, concrete aggregates, and blocks. Testing in government laboratories was useful in overcoming the initial prejudice and resistance of consumers to the project's products.

17. The project area, which was previously isolated, non-productive and barren, is now bustling with mining activities. Employment in the mines is provided to approximately 4,000 persons. As another 1,500 work in the crushing units outside the mine area, the figure for total direct employment is 5,500; approximately 29 per cent of those employed are female. The financial return helps significantly in alleviating poverty through productive, non-inflationary employment. Some of the entrepreneurs are now trying to set up a few stone-based small industries to produce prestressed concrete poles.

18. The women workers constitute an important segment of the employment population of the project. Almost all are married and work with their husbands and other family members, thus add substantially to family income. They do much of the hard manual work, and though traditionally women are paid less than men for similar work, it is difficult to define clearly specific economic indicators because these women are paid on a piece-rates basis and work with others. Their rate of absenteeism is much lower than that of male workers and is due more to family compulsions. Women are more responsible for the needs of young children and constitute a stabilizing force in the economy of the poor tribal community. Thus any socio-economic support given to women workers will contribute to the betterment of the education, health care, and living standards of children.

19. Because of the extensive excavations, the area is environmentally degraded and measures need to be taken to mitigate such degradation. A small part of the mine earnings could, and should, progressively be utilized for this purpose. However, the income level of the entrepreneurs is not yet adequate to take care of both mine investment needs and environmental concerns. It is therefore necessary to undertake, simultaneously with an "equipment bank", an environmental project with a substantial start-up fund contributed by some donors.

20. As for future prospects, the demand for stone materials in Calcutta and in Asansol-Durgapur is increasing. The mineral potential can meet both the needs of the entire State and the vast potential for export to adjacent Bangladesh, once the absence of a railway siding to handle a substantially bigger output is overcome. It is also necessary to help the entrepreneurs to gradually equip their mines mechanically to improve productivity, cut the cost of production, reduce hard labour, and increase labour wages and amenities so as to make them consistent with those of a market economy. One proposal involves a scheme for financing future development, for example, through an equipment bank or pool, in view of the fact that very few entrepreneurs can afford costly modern equipment.

21. Finally, the entrepreneurs have formed an association financed from their mineral sale proceeds. However, they lack training in long-term planning and operation. Given appropriate guidance the miners could afford to repay any loans. In conclusion it can be stated that if handled properly and with imagination, the project could be the basis for further industrial development of other minerals resources in the area. It has already resulted in noticeable poverty alleviation.

2. Gemstone mining in Orissa

22. Orissa is one of the richest mineral-bearing states of India, with mining potential for over 20 different gemstones (including diamonds) covering more than 2,000 square kilometres in six districts. The Department for Development Support and Management Services of the United Nations Secretariat is helping the Orissa state Government develop its gemstone prospecting and mining operations as well as its ability to evaluate gems. Technical and economic aspects of the gemstone industry are being addressed as is employment, particularly of tribal people, with emphasis on women and environmental protection. If Orissa can take advantage of its wealth in precious and semiprecious stones, it can increase its resources for development needs and earn foreign exchange, as the gemstone market is largely outside India. In fact, gemstones are becoming India's leading export earner. The project has hired international experts to survey the mining areas and provide a number of technical inputs, including equipment for a modern laboratory that can be used to analyse and evaluate gemstones. Geologists, including two women, have gone abroad for training in new techniques, and a modern portable gem processing-plant was purchased to accelerate the prospection of gemstone deposits.

23. As in many other countries, the gemstone industry in Orissa is beset by the problem of illegal mining. Since all mineral resources in India belong to the Government, the digging and extracting of gemstones by local people, even on their own land, is considered illegal. Though gemstones in Orissa have been mined for a long time, legal mining has only started recently. In the meantime, Orissa gemstones have been traded in world markets where the high quality of its raw stones is well known. Gems of exceptional quality (diamonds and rubies) have appeared in the London and Bangkok markets. Local people, living in the vicinity of gemstone-bearing areas, and traders in gems are quite aware of the availability and value of Orissa gems. In Orissa, gemstones are found on or near the surface of the ground, as well as in riverbeds, making it easy for local people to dig shallow pits in many gem-bearing areas and to pan the river sands for stones such as garnets, rubies and even diamonds. Dealers, attracted by these finds, have stimulated this activity. Government officials indicate that these dealers buy the gemstones for a pittance and resell them for millions of rupees.

24. Even though the Government has tried to exercise control over illegal activities, the panning or the mining of gemstones has continued, with 50,000-60,000 people engaged in this work. To address this situation, the Orissa state Government created its own Orissa Mining Corporation (OMC) for the exploration and extraction of gemstones in the state. These operations are the only legal ones and as a result several promising areas with gemstones such as rubies, garnets, aquamarines and cat's-eyes have been found. Because they are of poorer quality, there has not been the expected economic return. To improve the commercial side of its activities, OMC formed a 51 per cent/49 per cent joint venture with the Gemstone Corporation, Orissa (GEMCO), the large private firm of renowned gem dealers with experience in prospecting and marketing through an international network.

25. However, owing to the federal Government's new policy of encouraging privatization of public enterprises, the Orissa state Government now plans to

offer to private entrepreneurs concessions on lots in gemstone-bearing areas through competitive bids. In light of this policy, the joint venture of GEMCO and OMC has started to exploit commercially three ruby-producing blocks in the Kalahandi district. Private contractors will now be able to lease the land from the Government, thus making all operations legal. Where agricultural land is concerned, it has been the practice of OMC to expropriate that land and to pay the farmers a high price for it, since gem-bearing land is valuable.

II. SMALL-SCALE MINING AND ENVIRONMENTAL PROTECTION

26. To encourage the development of small-scale mining as a means of increasing income to alleviate poverty and offer opportunities for entrepreneurship, a stable system of law and "the rules of the game" must be set in place along with measures to protect the environment.

A. Adaptation of related legislation and regulations

27. Some people argue that legislation that applies to small-scale mining should be separate from general mining law. However, to create a stable system of law relating to mining, the policy it envelops should be set forth in one piece of legislation. Regardless of the scale of the mining being undertaken, there are fundamental principles that mining legislation must address. Without these fundamental factors, it is impossible to ensure that the mining, whether it be large-scale, small-scale or artisanal, will be carried out in a sound way. To mine a resource, the Government must be certain that there is indeed a minable resource in the area for which application is made, that the mining method proposed will result in the optimum exploitation of the resource, and that there is competency in mining and environmental management.

28. In large-scale mining projects, the applicant is usually asked to submit costly detailed mine plans on mining and processing methods, the technology being used, the financing plan, the environment management plan (including reclamation), and the training and local benefits envisaged. Obviously, it is not practical for the same scale of plans to be involved in a small-scale mining project but there still needs to be a proposal as to what will be mined, how it will be mined and with what methods, and how financing will be arranged.

29. Because small miners often lack even fundamental skills in geology, mining methods, accounting and financing, frequently their mining methods are inadequate and harmful and result in illegal mining activities. It is in this area that government support must differ for large-scale and small-scale mining activities. The small-scale miner will need assistance in defining the geological potential, in obtaining funding for the project and in implementing proper mining procedures. If Governments want to ensure the sustainable development of small-scale mining areas, there must be commitments to assist the miners.

30. Another problem of small-scale mining arises in the areas of health and safety. Often the activities involved are inadequately regulated and dangerous owing to the lack of healthy environmental and basic safety standards. Thus,

the health and safety regulations drawn up by the government must address these issues and a commitment must be made to monitor and inspect sites with consistent enforcement. However, environmental standards, inter alia, for air quality, water quality and noise should not differ because of the size of the operation. To be less stringent in applying these regulations to small-scale mining will result in the degradation of the area and a lack of consistency in developing standards that apply equally to everyone.

31. In general, most countries have adequate mining laws that address the requirements that must be fulfilled in order to exploit a given resource. Some adaptation is often necessary to ensure that the policy addresses modern mining techniques. Weaknesses generally prevail in the monitoring and enforcement of the laws, particularly in the areas of health, safety and the environment. Often labour laws are inadequate or ignored. Penalties for enforcement of laws and regulations can be a deterrent if the perpetrator realizes it could affect the profit from the operation. However, Governments are often dealing with miners who have very little capital and are unable to pay penalties. Thus, new approaches are necessary in such areas as training, workshops, assistance of experts, and monetary incentives (which should include easier access to credit). Adequate compliance can be ensured by monetary incentives for such elements as the use of clean technology. Governments can assist the small miner in finding the technology most adequate for his mining plan by giving tax incentives for the purchase or rental of equipment and for other technological investments. Training subsidies could be made available in such areas as accounts and mining methods.

32. A major problem in formulating standard legal approaches to mining occurs in the area of land ownership. Many countries have entirely different approaches to the ownership of land and this presents different problems with regard, inter alia, to exploration programmes, approval systems for licensing, compensation, and public inputs. For instance in Papua New Guinea, land is owned by the local clan and it is impossible to gain access to that land without its approval. In other countries, while the land may be privately owned, Governments can devise mechanisms for achieving agreements, and even expropriation, in order to exploit the resources therein. Land ownership becomes even more sensitive in the area of small-scale mining especially with regard to illegal mining activities. A conference on "Mineral rights and small-scale mining in a future South Africa" held at MINTEK, Johannesburg, South Africa, in August 1993, identified land ownership as one of the most difficult impediments in that country to successfully generating a solid small-scale mining sector.

33. It is recognized that environmental degradation is most often the result of small-scale mining operations. As mentioned previously in this report, because of the miner's lack of knowledge of how to exploit the resource, maintain standards and use chemicals, the health of the local population and the environment are affected. The lack of adequate financial resources is an additional problem. In the event that environmental degradation occurs, Governments could carry out, and pay for, the clean-up without necessarily closing the mining operation. Recompense for these expenses could be obtained through a garnishee of income from future activities, thus making the polluter pay, but on an incremental basis and without affecting the continuation of the

operation. In other countries, small-scale mining associations have established funds (collected from the miners) that will pay for such damage. This works with legitimate operations; however, it does not work with illegal mining, as no formalized system is established therein.

34. There are obvious costs involved for the small-scale miner's operation. Even though his mine may cost less to develop than a large mining operation, the financial impact is still comparable. This is especially true for environmental management. There needs to be some pragmatic approach in the taxation system that will accommodate these costs and make the operation worthwhile to the small miner. Some simple procedures would also minimize the impacts. For instance, if a miner is having difficulty in meeting certain standards, government (or the small-scale mining association, if established) could assist by making expert advice available on equipment and methods. The finding of practical solutions will result in better mining than penalizing measures (which often cannot be enforced) or the shut-down of operations.

35. However, it is in the implementation and monitoring of the legislative regime that most Governments fail. This is due to a variety of factors: lack of skills, lack of training, inappropriate organization, lack of concentration on inspection and monitoring responsibilities, poor enforcement procedures and lack of funding to sustain adequately the implementation of the regulatory system. It is a fallacy to think that a large number of people are necessary to ensure a properly working mining sector. The Ministry needs three components: an active and well-trained Geological Survey, a Mines and Inspection Division for licensing and inspection, and a Policy and Planning Division to ensure that legislation and the regulatory system are working, to advise on adjustments, and to disseminate information to the mining community. The Geological Survey provides geological information and assistance. For small-scale miners, training, inter alia, in basic geology, map reading, pegging of claim areas, and assaying of information, can be of real benefit to the operation, and can lessen environmental impacts and increase safety and health in the environment. The Mines and Inspection Division has two functions: to review and grant applications, and to carry out the monitoring and inspection of operations. Zonal offices where inspectors are located are very helpful, as they bring government assistance closer to mining operations and are more readily available for the purpose of assistance.

36. Problems with government inspection arise in many cases because the personnel are paid low salaries, and are poorly managed, and lack the necessary skills to advise and assist the small-scale miner. Lack of money means that travel to sites is restricted and thus enforcement does not occur. Full and ongoing training for Ministry personnel is a must if Governments are to adequately address the environmental impacts of small-scale mining. Mining income to Government most often ends up as part of general revenue and little is put back into the implementing Ministry. Governments need to develop some mechanisms whereby ministries that earn income from the activities they regulate receive a percentage of that income in order to fund their personnel, maintain training programmes and carry out monitoring and enforcement. Giving personnel the tools to carry out their responsibilities results in better work habits and more pride in accomplishments.

B. Balanced environmental legislation and regulation, and sound environmental practices

37. Environmentally acceptable mining operations are dependent upon balanced environmental legislation and sound environmental practices. Environmental considerations are now being included in all United Nations project activities. Environmental management systems and auditing as well as site reclamation procedures are being provided as an approach to establishing structured systems that ensure that a consistent standard of high environmental performance is maintained. Two useful programmes or procedures are being proposed for United Nations projects.

1. Environmental Management Programme (EMP)

38. The Environmental Management Programme (EMP) is a comprehensive, structured system that identifies all components of corporate environmental management from policy, accountabilities, resources identification, legislative context and compliance requirements through operational performance, training, and documentation (system management). It is a most useful focus for environmental auditing of mine site (or mineral processing) operations. Once a proper system is in place, the role of the audit is to evaluate the effectiveness of the system, spot-check monitoring results as well as actions triggered by unexpected or non-complying results, and make recommendations on changes that would enhance the effectiveness of the system or the environmental performance of the operation.

39. Increasingly, the requirement that all industry having a significant impact on the environment be made accountable for its environmental performance, is becoming an accepted part of many national policy frameworks. EMP will incorporate regular reporting to the Government on the effectiveness of the environmental programme. EMP is based on the environmental data and proposed mine operations information compiled for the environmental impact statement (EIS), or on information generated from an environmental audit of the operation. In the event that this process triggered an audit, the environmental audit would gather all relevant environmental information necessary for implementation of effective environmental protection and rehabilitation programmes as well as any additional environmental baseline information required for evaluation of an environmental monitoring programme.

40. EMP should include the documentation of all relevant information, plans, targets, policies, objectives and management systems operating at the site. The matters of the responsible personnel, their authority and the resources available to them, the management of environmental records, communication and feedback networks, and employee training programmes for environmental awareness should all be addressed in the EMP documentation. EMP should provide for a means of accessing updates of government and corporate environmental regulations and requirements. It should also include an audit plan that incorporates a regular mechanism for checking the level of compliance with regulatory conditions and the environmental performance of all components of the operation. These procedures need to be structured to enable identification of areas where environmental improvement could/should take place and incorporate a mechanism

for initiating an action plan to effect such improvement. EMP, and its targets and objectives, would also be linked to a national environmental policy as reflected in the country's environmental law regime.

41. An Environmental Guideline for the Mining Sector is being prepared by the Department for Development Support and Management Services of the United Nations Secretariat in conjunction with the United Nations Environment Programme (UNEP). It includes a specific guide detailing the elements of an environmental management system that can apply to organizations of all types and sizes. It will enable an organization to establish procedures that implement its set environmental policy and objectives, as well as to achieve compliance and ensure continuous improvement through regular updating of information. Environmental management audits and environmental management reviews are inherent, though separate, parts of the system. Audits assess both the environmental management system and the achievements of the environmental objectives. Reviews check the continuing relevance of the environmental policy, update the evaluation of the environmental effects, and check the efficacy of the audits and follow-up actions. The implementation of a comprehensive environmental management system is essential to any organization with respect to its assuring itself of its compliance with a stated environmental policy and its being able to demonstrate such compliance to others.

42. Environmental auditing provides a crucial feedback mechanism to senior corporate management concerning the effectiveness of the environmental management of an operation and the extent to which that operation complies with environmental regulatory requirements. The audit procedure involves the gathering of all relevant background and current environmental data, reports, programmes etc. An inspection check-list is generally produced and addressed during the site visit by the audit team. The team may be an internal or external one, depending on the objectives of the exercise. The outcome of the audit should be a report of the findings of the audit together with recommendations and a setting forth of the means of their implementation. These findings and recommendations should be discussed with site management before the finalization of the report and its presentation to the company or cooperative.

43. To ensure that sound and acceptable environmental practices are implemented, it is becoming increasingly common for the approval system for mining leases to include the following types of conditions:

(a) Compliance with acceptable environmental standards (based on internationally acceptable standards);

(b) An Environmental Management Programme (to include an Environmental Emergency Response Plan, an Auditing Plan, and an Employee Training Programme and Decommissioning or Abandonment Plan);

(c) A mechanism for financing rehabilitation and abandonment;

(d) An Environmental Monitoring Programme, the results of which are to be reviewed by the relevant government agency or agencies at regular intervals (for example, annually) with provision for updating of the Environmental Management

Programme, depending on monitoring results and their consistency with environmental impact assessment (EIA) predictions.

44. The monitoring programme should be closely tied to the environmental management plan approved by the Government to ensure and demonstrate compliance with both the environmental conditions of the approved mine plan and the regulatory requirements. The monitoring programme, therefore, is a central focus of the auditing process, with respect to providing effective feedback on the extent of compliance and the systematic review of results to identify any breach of compliance. The monitoring programme should also identify appropriate actions that need to be taken to ensure a more acceptable environmental performance. In addition, the monitoring programme should assess the monitoring schedule to ensure that it is organized so as to be simple to operate and that it will provide useful data that can be directly utilized by the mining company. The essence of a good environmental monitoring programme is its simplicity.

45. The Environmental Management Programme is the mechanism through which to assert that a new reality of environmental care is now an integral element of mining industry activity. Small-scale miners will have both technical and financial difficulties in implementing an EMP; it is therefore the role of a Government to assist them in know-how transfer, environmental awareness training, financial incentives and provision of liability funds.

2. Site reclamation

46. The essential goal of reclamation is to return the affected areas as nearly as possible to their optimum economic and ecological value. (Reclamation cannot always aim to return those areas to their original state.) Land reclamation and restoration involves the regrading, landscaping and replanting of spoil heaps, pits, disused industrial areas and other disturbed sites. It often requires the re-establishment or construction of new drainage patterns, roads and buildings. The aims of land restoration are to reduce pollution, restore the land and landscape, improve the aesthetic appearance of the area and prevent further degradation. The land should be restored to a use that is at least as productive as that connected with its state prior to disturbance: restoration may involve a return to agriculture, forestry, a natural landscape, or residential, industrial, recreational or some other use. Restoration generally requires adequate quantities of soil of suitable quality for shaping relief, stabilization and revegetation.

47. The following set of recommendations reflecting the basic principles of reclamation are applicable to most mining operations and should always be followed:

(a) Prepare a plan of the proposed reclamation programme prior to the commencement of mining;

(b) To the extent practicable, restore the site progressively so that the rate of reclamation is comparable with that of mining;

(c) Ensure that the site is made safe;

(d) Always remove and retain topsoil for subsequent restoration and, where practicable, respread cleared vegetation on disturbed areas;

(e) Be aware of any legal requirements and ensure that these are met in the plan;

(f) To the extent practicable, reinstate natural drainage patterns where they have been altered or impaired;

(g) Remove or control residual or toxic materials. Identify potentially toxic overburden or exposed strata and screen with suitable material to prevent mobilization of toxins;

(h) Ensure that the reshaped land is formed so as to be inherently stable, adequately drained and suitable for the desired long-term land use;

(i) Minimize the long-term visual impact by creating land-forms that are compatible with the adjacent landscape;

(j) Minimize erosion by wind and water both during and following the process of reclamation;

(k) When mining is complete, remove all facilities and equipment from the site unless approval has been obtained from the regulatory authorities or affected landholders to do otherwise;

(l) Deep-rip compacted surfaces to relieve compaction unless subsurface conditions dictate otherwise;

(m) Provided it is consistent with post-mining land use, revegetate the area with plant species that will control erosion, provide vegetative diversity and, through succession, contribute to a stable and compatible ecosystem;

(n) Prevent the introduction of noxious plants and pests;

(o) Monitor and manage reclaimed areas until they are self-sustaining or until an end-point satisfactory to the owner or the government instrumentality responsible for the land has been reached.

48. Proper planning is the key to successful reclamation. Reclamation plans should be made as soon as possible and before mining commences. While larger companies can afford the cost of compiling data, reports and plans, the small-scale miner does not have access to such funds. Therefore some planning and financing assistance needs to be made available for such activities. Such things as reclamation funds could be used. Whatever mechanism is used, if Governments want to decrease degradation, they will have to play a greater "hands on" advisory and financial role than they have played in the case of large-scale miners.

III. REPLICABLE SMALL-SCALE MECHANIZED MINING OPERATIONS

49. There have been successful national small-scale mining projects carried out worldwide. United Nations organizations, as well as non-governmental ones, have provided technical assistance to many of these projects. Two projects, one for precious metals and one for non-metallic minerals, are presented.

A. Precious metals: a small-scale gold-mining operation in Burkina Faso

50. The gold deposit of Essakane, in the province of Oudalan in north-east Burkina Faso, was discovered in 1985 by artisanal miners engaged in mining gold by vanning and panning. It is one of a number of gold deposits. The ore body consists of primary and secondary mineralization.

51. At the Government's request, the Department for Development Support and Management Services of the United Nations Secretariat, through a project financed by the United Nations Development Programme (UNDP), entitled "Assistance to the evaluation and development of small gold mineralizations", attempted to organize the artisanal gold-miners by creating small-scale mining operations on the site. However, the sheer number of people involved (over 20,000) rendered this original objective unfeasible. Subsequent field evaluation studies made it possible to determine the existence at Essakane of substantial reserves. Various methods were tested to extract remnants of gold mineralization. The usual methods using gravity separation, with a recovery in the order of 40 per cent, proved to be uneconomic. The project financed metallurgic-treatment tests and concluded that the ore could be economically recovered through the use of lixiviation (heap-leach) methods, with a recovery superior to 70 per cent.

52. A small private company, incorporating the artisanal gold-miners at Essakane, was established with both local and overseas investors. Filière or, a Burkina Faso State company, in association with a French import company already established in Burkina Faso, formed the Compagnie d'exploitation des mines d'or au Burkina (CEMOB) (company for gold-mine exploitation in Burkina). Since August 1992, this private company has set up a small mine, and been successful in processing the remaining ore left behind by the artisans and small-scale miners. The investments are of the order of 800 million CFA (Communauté financière africaine, or African financial community) francs (US$ 3.2 million), and annual production is estimated at 500 kilograms of gold. The plant handles about 120,000 tons of ore per year, and employs 40 persons.

53. Inasmuch as Burkina Faso's Sahelian area is studded with artisanal gold-miners' tailings of the type found at Essakane, it is reasonable to envisage several small mines of the same kind in the near future. Assimilation of the process will open new prospects for the mining sector. Through the widespread adoption of heap-leaching, it will be possible to make good use of the low gold content that now exists and has thus far been unprofitable based on the employment of traditional treatment methods. The United Nations has been the principal architect of the Essakane mine's success. A training course for the purpose of teaching the application of modern technologies for gold extraction

has been organized for government employees as well as for those of the private and state-run companies in the country. The trainees will be in a position to disseminate this knowledge. Reliable guarantees for health and hygiene and for environmental protection and conservation are also part of the programme.

B. Industrial/non-metallic minerals

54. Industrial or non-metallic minerals, when of high quality, have many industrial applications and can be sold on both domestic and international markets. Some countries have implemented various approaches to the development of industrial minerals.

55. In Uganda, the Government has established the Uganda Non-Metallic Minerals and Products Association. Its purpose is to promote and strengthen the development of non-metallic mineral industries and to promote the efficient exploitation of non-metallic mineral resources and to participate directly or indirectly, alone or jointly with others, in such exploitation. A project at Mutaka, in south-west Uganda, for kaolin mining and processing, which would provide materials for ceramics and paint manufacturers, is under consideration.

56. In Ghana, a recommendation for the establishment of an Industrial Mineral Project Group, coordinated by the Minerals Commission, with its office in the Geological Survey, and supported by three international advisers, has been made.

57. In Malawi, through the cooperation of the United Nations Industrial Development Organization (UNIDO) and the British Geological Survey, the provision of bulk samples to potential consumers has resulted in the Engineering and Foundry Company's making a mining claim in Linthipe. The company intends to mine clays in order to make refractory bricks that would replace the import of Zimbabwe products and eliminate the unnecessary costs due to transportation of materials.

58. Once economic mineral prospects are identified and preliminary evaluations conducted, investment promotion must be carried out. This involves direct contact with possible investors and the making available of sample material, and the results of chemical analysis, and other physical testing. This is very important in the case of non-metallic or industrial minerals which have high purity or specific chemical qualities, as processing for added value will result in cheaper transportation costs. Investors want to have an idea not only of the quality but also of the immediate availability of material.

A mobile mining task force in Jamaica

59. A fully equipped mobile mining unit (with necessary key equipment) was set up by a Department for Development Support and Management Services) project in Jamaica. The project opened quarry sites, trained national staff to operate equipment and applied appropriate techniques for different mining conditions. Efforts were made towards minimizing degradation from quarrying activities by providing environmental impact guidelines. The project required an established government Geologic Survey or a Mining Department to provide the full support of

its expertise, staff, laboratory and other facilities. By means of (a) purchase of mining equipment; (b) training of national staff in the use and operation of the equipment; (c) opening of quarry rock-faces to provide material and show the rapid availability of mineral resources to investors; (d) evaluation of the material through studies, chemical analysis and physical tests; and (e) submission and promotion of results to interested local and international investors of mining services.

60. Seven marble rock-faces in different marble deposits were opened. Technical evaluation reports were prepared for the respective sites. These reports are used by local investors to obtain or negotiate financing, development agreements, or joint ventures. Consultancies were provided to assess the technical conditions and constraints associated with marble quarrying; assessment of the impact of industrial mineral extraction on the environment was carried out and recommendations for national guidelines on environmental impact were made. A review of national legislation and regulations pertinent to mining was carried out.

61. The mobile mining team or task force has proved to be an effective method for providing rapid practical hands-on assistance to development. Local investors and mine producers were involved through cost-sharing of the mobile team's operating expenses. International investors were attracted to open quarries in Jamaica.

IV. HEALTH AND SAFETY: IMPROVEMENT OF MINERS' WORKING CONDITIONS

62. Small-scale mines can provide considerable employment, particularly in rural areas. Unfortunately, many of these workplaces are perilous and do not conform with international and national labour standards for health and safety. A common deficiency is the lack of data. Uncontrolled small-scale mining can have a major adverse impact on the environment, and work in artisanal mines is often dangerous and unhealthy. In order for small-scale mining to be prosperous and safe, it must change from an unorganized, unsupervised activity to one that is modernized, monitored, organized and supported in order to meet specific goals. A major disadvantage of artisanal mining is the low throughput of material despite arduous physical labour. Measures to improve working conditions and output need to focus on the quality of work in small-scale mining, rather than on the quantity. Any increase in the quality of human input to artisanal mining will be more than matched by increases in the quantity, quality and value of output, as more efficient production will occur resulting in higher value even at the primary-processing stage.

63. Mining is probably the most hazardous of all occupations. Many of the world's 30 million mineworkers are exposed to a range of health hazards and occupational risks. Rapid changes in geological conditions, or the consequences of natural forces such as flooding, can result in major damage and loss of life. In addition to these risks, mineworkers are subjected to the effects of long-term exposure to high noise levels, toxic gases, dusts, chemicals, vibration, insufficient lighting, heat and cold, and repeated strain-related injuries. Certain occupational safety and health risks are particularly severe in small-scale mines, and there is indeed a strong correlation between the size of a mine

and the accident rate. Recent figures from both the United States of America and Canada show that the frequencies in underground and surface mines of accident-related lost time are generally higher in smaller mines.

64. Because of the lack of hard data, notably in developing countries, the number of accidents in small-scale mining is undoubtedly higher, and the incidence of disease is undoubtedly worse, than appears. The reasons behind the occupational safety and health problems in small-scale mines are several, including the inadequate training of workers and managers, the lack of trained inspectors (and therefore of inspection), poor-quality and poorly maintained mining and processing equipment, the lack of financial resources and intermittent mining operations.

65. There is no case to be made for compromising on safety and health issues. Because many small mines operate on a shoestring, miners are not willing to spend scarce resources to improve safety and health practices, particularly since such outlays will not bring any financial rewards in the short term. Moreover, many or all of the workers may be co-owners of a mine and therefore willing to accept a higher degree of personal risk in order to increase profit levels regardless of any statutory controls that might exist. Where mineworkers are employed in artisanal mines, as opposed to being co-owners, the relatively high wages they often earn through piece-work can be sufficient to make them ignore the hazards of the work. On the other hand, unemployment in many rural mining areas is such that the mineworkers often have little alternative but to accept the working conditions with which they are faced.

66. Underground workings are particularly unsafe, since they are often constructed haphazardly by different groups of miners with no regard for the overall effect such tunnelling can have. Inadequate roof supports, work space, and travelling and hoisting facilities compound the problems. Health problems stem from the lack of ventilation, sanitation, lighting and dust control. Cave-ins are common and a major accident risk. The major health risks include pneumonia and back injuries. Hygiene education is often non-existent and the living and working areas of a mine and its surroundings can have water supplies that are highly contaminated with silt, mercury and organic materials because of the lack of sanitation. These factors increase the overall cost of medical treatment because illness and disease spread quickly.

67. Keeping small-scale miners adequately informed about mine safety can ensure that efforts to reduce accidents are directed where they are likely to be most effective. This means that up-to-date information on the numbers and causes of accidents is necessary in order to establish a campaign of accident reduction. Miners must be assured that the data collected will be used for their benefit, and not as a means to penalize them.

68. Small-scale miners will have to be motivated to improve occupational safety and health. They must be sure that there are material benefits to be had from changing current practice. For accident prevention and health improvement programmes to succeed, the worker and the conditions of work must be considered together. Safety performance is closely linked to particular operations carried out in an individual mine. Thus the means to improve safety must be focused on mine-specific operations. Broad guidelines should be produced and will be

useful. Specific safety and health regulations are often best developed from a base of broad principles that are flexible enough to be applicable in a range of different conditions.

69. The major economic importance of mining in many countries and the hazardous nature of mine work, and the inadequacy of legislation, have resulted in the preparation of an ILO convention on safety and health in mining. A draft text will be discussed in great detail at the International Labour Conference in 1994 and again in 1995, prior to being submitted to the Conference for adoption in the latter year. The convention would cover the duties and responsibilities for safety and health of Governments, employers and workers. It could establish a specific policy on the prevention of occupational accidents and illnesses and set procedures to implement that policy, including technical standards, reporting, cooperation between employers and workers, inspection of work sites and the investigation of accidents and work-related diseases. A range of preventive and protective measures, including emergency preparedness and rescue operations, might be provided. Of special concern in the drafting and eventual implementation of this convention will be workers' safety and health in labour-intensive small-scale mining operations. A questionnaire seeking detailed views on all these issues was sent to all ILO member States in mid-1993. The responses to the questionnaire will determine the scope and content of the initial draft. It is hoped that if a specific mining convention is adopted it will be widely ratified and lead to significant and lasting improvements in mine safety.

70. Having standards, codes of practice and regulations in place is important. To get information to individual mine operations and mineworkers, there must be a sufficient number of trained persons available to deal with local needs, and provide information to those concerned. Involving small-scale mineworkers themselves in developing the means to improve occupational safety and health is of paramount importance. Workers are in the front line, and the hazard they face is based on direct experience. The benefits of ensuring the direct participation of small-scale miners in hazard management programmes are likely to be substantial, particularly because of the effect of training, since these mines do not have the resources to employ a professional safety officer, nor to provide training for their workers.

71. Any measures to stimulate the development of small-scale and medium-scale mining will need to be designed to demonstrate to miners that there are benefits to be derived from the changing of their traditional practices. The key persons will be the mining inspectors whose recommendations must be specific, relevant, simple to understand and straightforward with respect to implementation. They will be unable to accomplish these tasks without adequate training, resources and back-up. All of the activities will require funding and institutional support.

72. Small-scale and medium-scale mining must be encouraged by creating the operating environment that fosters the use of best practices for mining, occupational safety and health and environmental protection. That environment, together with institutional arrangements that provide for the effective implementation of regulations by strong, informed government institutions, will enable small-scale and medium-scale mining to thrive. In this way, the

existence of such mining as a socially and economically beneficial activity that enriches the entrepreneurs and workers who are directly involved, together with the regions and countries in which it takes place, will be assured.

V. POSITION AND ROLE OF WOMEN IN SMALL-SCALE MINING

A. Making women miners visible

73. In 1993, women's participation in small-scale mining still was relatively modest, but it is growing steadily, especially in the artisanal and informal sector. While national statistics do not usually differentiate small-scale miners by gender, it appears that women are involved in all sectors of the activity. For example, several women miners participated in the Harare International Seminar. They pointed out that the state of general economic deterioration, with the resulting social hardships, had pushed women into male-dominated activities that could provide more substantial incomes. These women, mainly heads of household, were very aware of the trade-off involved in abandoning their traditional roles, but for them informal mining was a necessary economic alternative to subsistence farming.

74. In view of the increased relevance of the contribution of small-scale women miners to rural economies, several actions should be implemented by developing country Governments, and their development partners, namely, international cooperation agencies and non-governmental organizations. If launched, those actions could alleviate many of the specific problems faced by women workers in the informal sector, including specific environmental issues as they impact on the welfare and health of women and their children.

75. The report of the Secretary-General on recent achievements in small-scale mining activities in developing countries (E/C.7/1993/11) provided the Committee on Natural Resources with a well-documented review of the gender-related constraints that penalize female miners. Through its activities the United Nations system tries to help women gain access to income-generating activities in general, and to those in mining in particular. The Harare Guidelines allude to the status of women miners and the need to ensure that they enjoy the same status, circumstances and facilities as their male counterparts and are not subject to prejudicial conditions. In addition to seminars, 2/ which facilitate the exchange of information and stimulate experience-sharing, several projects have been designed and submitted to donors. This updated report will concentrate on outlining the recent efforts that aim at assisting the ever-growing number of women miners.

76. Like their male counterparts, women miners fall into two distinct categories: subsistence miners or panners (informal miners), who constitute the majority, and mining-claim holders whose operations present some degree of mechanization. 3/ Both groups require training. Women are particularly penalized because of an educational handicap, since too many are barred from formal education and skills.

77. Because the women in the first group are usually illiterate and rurally based, and sometimes belong to indigenous groups, the launching of well-targeted

poverty alleviation programmes could assist in bettering their economic and social well-being. Such programmes should include long-term strategies aimed at establishing the best possible conditions for sustainable local, regional and national development with a view to combating poverty. Women panners are among the most disadvantaged group and should be assisted on a priority basis through enhanced health care, and basic education; eventually they should be aided in attaining land ownership to improve their economic standing. In addition, policies aimed at removing regulations and other obstacles that prevent the growth of the informal sector and its integration into the economy should be devised through the organization and involvement of community-based groups. Simultaneously, there should be grass-roots programmes aimed at combating discrimination against women.

78. For more privileged women, mining is also an alternative, a business opportunity and a long-term investment. Women miners who belong to this category believe that the difficulties they face in developing their business are related not to gender, but to culture, and these cultural impediments are the toughest to overcome. Unlike the informal miners, women in this entrepreneur category are literate, and some have a university degree; they have already achieved some economic independence and look at mining as an attractive alternative business opportunity.

79. Lending institutions are conservative by nature and as women carry no political weight, access to capital is a major impediment. It is exacerbated by much of the national legislation that does not facilitate loans to women in their own right. That legislation reflects the cultural and attitudinal bias prevalent in many societies. A handful of developing countries are now adapting their laws to ensure that the female segment of the population contributes more constructively to economic development. The economies in transition have granted equality status to women. As a result, their female population is seen as better equipped to participate fully in public life and enter into business development. New legislation is being enacted to facilitate and guarantee that women have access to property and credit in their own right. This change in legislation must be accompanied by a no-collateral lending mechanism which is crucial to developing female entrepreneurship.

80. The project profiles that were prepared by the participants in the International Workshop on the Role of Women in Environmentally Sound and Sustainable Development 2/ have in common three broad and recurring objectives and address issues that are not necessarily gender-specific. The first objective includes the identification of specific women's problems, with such identification aimed at the collecting of sex-segregated statistics with a view to the formulating of appropriate governmental strategies for intervention, and seeks the identification and analysis of socio-cultural constraints. The second objective aims at raising the self-assertiveness of women for which training is a key element. Training should be provided to facilitate women's access to environmentally sound mining techniques, in administrative management and in overall environmental protection and land reclamation. Intimately associated with the land, women are regarded as highly environment-sensitive. Hands-on training by means of demonstration projects is particularly beneficial. The third objective aims at setting up a small-loan mechanism for women entrepreneurs, taking into consideration the social and legal status of women

and the constraints thereof. The resulting tasks involve evaluating and selecting mining property, and revising legislation to facilitate women's access to property, especially in patriarchal societies. Access to credit is the cornerstone of a successful entrepreneurship programme. Outreach programmes must be set up to identify talented and assertive women for use as role models, and through educational and innovative approaches to enhance their self-confidence.

81. Commercial banks are neither equipped nor interested in providing small loans at a reasonable interest rate. However, alternatives already exist. Some countries have set up a small-loan mechanism. Loans are financed at concessionary rate by multilateral or regional development banks. Some non-governmental organizations, including international charitable and religious organizations, that are acting at the grass-roots level, have organized successful revolving funds to provide start-up financing for small entrepreneurs.

82. Capacity-building as well as start-up financing could be funnelled through local professional associations. In Zimbabwe, the Small-scale Miners' Association of Zimbabwe (SSMAZ) stands as a good example. The United Nations Development Fund for Women (UNIFEM), with the technical assistance of the Intermediate Technology Development Group (ITDG), is presently conducting a training course for women members of SSMAZ. These associations may be better suited than cooperatives to meet the miners' needs. The structure of many small miners' cooperatives lacks the flexibility to foster individual entrepreneurship. However, cooperatives could play a useful formalizing role at the informal level, in organizing individual miners to reach some economies of scale which are crucial to obtaining licences, improve their marketing capability, and attract technical and financial assistance. Although mining is regarded as a non-traditional sector for women, women's participation in artisanal and small/medium-scale mining should be encouraged and strengthened. In rural areas, many women who are the breadwinner as head of household can use mining to scrape a living by panning gold in the rivers.

83. To accelerate the economic and social development of rural communities, Governments should strive to implement policies conducive to the creation of non-farming jobs, particularly for women. Unlike the traditional agricultural tasks, these new activities could free women from culturally imposed impediments. For many women miners in the developing world, small-scale mining could be a step towards self-reliance and greater social and economic freedom.

B. Sustainable development and women small-scale miners

84. As indicated in document E/C.7/1993/11, small/medium-scale mining has an adverse impact on the social and physical environment. In rural areas, women are bearing a large share of the agricultural chores, and they have traditionally played crucial roles in the day-to-day supply, management and use of water. Therefore, resources degradation and pollution affect the livelihood of women and their children. For this reason, countries are being encouraged to translate the women-related dimension of Agenda 21 4/ into national policies and programmes to integrate environment into development goals. Women, because of

their traditional role, should be allowed to participate and impart their particular knowledge to this effort.

85. Principle 20 of the Rio Declaration on Environment and Development 5/ states that "women have a vital role in environmental management and development". The issue of Women in Development (WID) was included in all programme areas of Agenda 21, particularly in those of chapter 24, entitled "Global action for women towards sustainable and equitable development", which addresses global development and development policy action programmes for achieving sustainable development. The United Nations Conference on Environment and Development, in paragraph 24.11 of Agenda 21, emphasized that bodies of the United Nations system involved in the implementation of Agenda 21 "should ensure that gender considerations are fully integrated into all the policies, programme and activities". However, most of the activities included in chapter 24 of Agenda 21 are to be implemented at the national level.

86. To this end, chapter 24 calls very clearly for the full integration of women into national and international ecosystem management and control of environmental degradation. It also stresses that the participation of women is crucial to the successful implementation of Agenda 21. Among the objectives proposed for national Governments is to consider developing and issuing by the year 2000 a strategy of changes necessary to eliminate constitutional, legal, administrative, cultural, behaviourial, social and economic obstacles to women's full participation in sustainable development and in public life. This strategy will, inter alia, ensure women's access to vocational training, all forms of credit, particularly in the informal sector, and property rights. Programmes to (a) support and strengthen equal employment opportunities and equitable remuneration for women in the formal and informal sectors, (b) eliminate persistent negative images and prejudices against women, and (c) enhance the legal capacity of women to gain access to entitlement to natural resources, technology, banking facilities and the control of pollution at the workplace are also included in Global Action for Women Towards Sustainable and Equitable Development as set forth in Agenda 21. Moreover, the provision for environmentally sound technologies, jointly developed with women, with particular application to clean water supply is encouraged.

C. Women miners in Ethiopia: a case history

87. Ethiopia proposes to enhance the participation of rural women in income-generating activities, of which mining is one. Ethiopian women are involved in all facets of the economic life of the country. Moreover, informal mining is playing an ever-increasing complementary role with respect to the rural economies. For the purpose of strengthening the economic role of Ethiopian women, UNDP has included an extensive assistance component in its fifth country programme for Ethiopia (1994-1998). A specific component aims at raising the status and participation of women in decision-making, planning and programme execution in mineral development. The total cost for this component is estimated at US$ 1 million which should be provided by donors.

88. Rural communities have traditionally been important producers and end-users of minerals in the formal as well as the informal framework. The contributions

of rural communities and women miners have not received the recognition they deserve nor have their contributions been financially quantified. The workplace of the Ministry of Mines and Energy and of related institutions is estimated to be 25 per cent female. In the private sector, as licence holders for mining and jewellery-making, women constitute about 30 per cent of all licensees. Thirty-five per cent of all quarrying labour is female. Women perhaps produce all the pottery used in Ethiopia. Lack of recognition for this important cottage industry has deprived it of the possibility of realizing its potential for attaining higher standards of production and income enhancement. Rural populations that are engaged in informal gold-mining (an unquantified but important number of those so engaged are women) do not benefit from their mining.

89. Ethiopia has recently enacted the Mining Proclamation Act, which ensures land right tenure. This legislation aims at encouraging mining as a long-term and sustainable industry. In this regard, the Department for Development Support and Management Services project ETH/90/016 on "Mining investment promotion" is enhancing the technical capacity of women in mining by providing training to the female professionals who are involved in project activities. This effort is not limited solely to the Ethiopia project. Without setting gender quotas, the Department for Development Support and Management Services of the United Nations Secretariat is insisting that female project staff enjoy the same exposure to training programmes as their male counterparts.

VI. CONCLUSIONS AND RECOMMENDATIONS

90. The present report has concentrated on issues related to the impact of small-scale mining on the physical and social environment and the need for adequate legislation in this area. Policies and strategies for achieving an efficient control of small miners without dampening their economic dynamism have been enumerated for some time. Only recently has specific attention been given to the most serious drawbacks of small-scale mining (particularly informal mining), namely environmental damage and pollution. Although most of the efforts must occur at the national level, cooperation between neighbouring countries, under the umbrella of regional intergovernmental organizations such as the Southern African Development Community (SADC) or through technical cooperation among developing countries (TCDC), can provide cost-effective ways of establishing joint facilities benefiting large numbers of small-scale miners. Today, developing country Governments and those of economies in transition are looking with renewed interest to the development of the domestic private sector as a means of creating new jobs. Meanwhile, these Governments face the challenge of incorporating the ever-growing informal sector into a more structured framework.

91. The Harare Guidelines provide Governments, development agencies and non-governmental organizations with a reasonable framework for harnessing the economic vitality of small-scale mining as well as for mitigating its drawbacks. Small-scale mining has always hit a sensitive nerve, but in spite of all its negative side-effects, it has a significant and positive impact on national and regional economies. However, in some countries, its economic viability and sustainability are being questioned.

92. Small-scale mining has become a mainstay of many rural economies, and in many regions of the world, women have joined men in the sector. A legal framework that recognizes the existence and characteristics of small-scale and medium-scale mining is a prerequisite of its "formalization" and of limiting its negative environmental impact. Informal mining cannot be regarded as an economic alternative to landlessness or even as an opportunity for migrant and jobless urban dwellers to return to the countryside. Laissez-faire attitudes have resulted in "mining rushes" which become rapidly uncontainable, and short-term damage control initiatives have usually failed when confronted with the sheer energy of a demand-driven activity.

93. Small-scale mining should be legalized and formalized to promote its growth. If it cannot become economically viable and environmentally sustainable, alternative employment opportunities need to be identified and promoted. Small-scale mining should benefit from the technological gains achieved by the larger-scale operations. New gold extraction technologies and creative marketing have helped reduce production costs in industrialized mining countries. Economies of scale as well as critical mass could help in reducing cost. Sharing production and environmental technology and expertise and establishing pooled marketing endeavour could improve profitability. National and regional professional institutions could find an increased and valuable role in facilitating this process.

94. Because development implies economic growth, only organized, well-regulated, legal mining operations can meet the goal of sustainable development. Command and control mechanisms usually achieve very little when up against the sheer energy of informal mining, as results are generally very short-term in nature and very limited in scope. Governments may attain more sustainable results by implementing market-driven measures and establishing a simple and fair tax system rather than by being directly involved in the marketing of the production of small-scale miners. Conversely, the constant involvement and support of governmental institutions are crucial to facilitating vocational training, transfer of technology, and access to information and credit. Environmental protection calls for a constant government commitment to these areas. When devising a legal environment conducive to entrepreneurship development, Governments should, when applicable, concentrate on erasing cultural and attitudinal biases which restrict the participation of women in the business mainstream.

95. The development of non-metallics, particularly building materials, is not getting enough governmental attention. These minerals deserve more emphasis when business policies are being formulated. They can be even more important to regional economic development than both precious metals and gemstones. The availability of end-users and markets, as well as those non-metallics' amenability to simple on-site processing, can result in the initiation of industrial development.

96. Since 1972, when small-scale mining became an item in the agenda of the Committee on Natural Resources, limited United Nations funding has hampered the activities of the Organization, particularly in implementing successful demonstration projects. However, projects like the gold recovery plant in Essakane, Burkina Faso, as well as other demonstration or self-help projects

launched with non-governmental organization support, have demonstrated that artisanal/small-scale mining can become economically viable as well as socially and environmentally acceptable. Under these circumstances, the Committee on Natural Resources may wish to recommend that the United Nations system, according to its mandate and field of expertise, continue to strengthen its activities in this area.

97. Serious efforts are still needed in small-scale mining regulation and promotion, particularly to mitigate environmental damage, minimize social upheavals and curb smuggling. These efforts should include transfer of technology, institutional and capacity-strengthening, and private sector and local entrepreneurship enhancement. These activities could direct Governments' efforts in the creation of rural cottage and semi-industrial development centres. Those centres could be established either by attracting small-scale mining profits, in the case of precious metal and gemstones, or by stimulating non-metallic and building-material quarrying and processing. The purpose of the centres would be to ensure the economic and social sustainability of the region.

98. Those centres could well have a magnetic effect by enhancing the business development viability of the regions and by providing an impetus for more formal and successful participation by local people in entrepreneurial activities.

Notes

1/ See Official Records of the Economic and Social Council, 1993, Supplement No. 8 (E/1993/28), para. 17.

2/ The participants in the "International Workshop on the Role of Women in Environmentally Sound and Sustainable Development", held in Beijing from 9 to 15 September 1992, prepared concrete and replicable project proposals, which were submitted to international donors. In the area of sustainable rural development and development of micro-enterprises, four generic projects addressing small-scale mining were drafted by the participants.

3/ Female mining entrepreneurs are still largely outnumbered by informal women miners; however, their number is growing. In Zimbabwe, for example, some 400 women are active members of the 4,000 strong Small-scale Miners' Association of Zimbabwe (SSMAZ).

4/ Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992, vol. I, Resolutions adopted by the Conference (United Nations publication, Sales No. E.93.I.8 and corrigendum), resolution 1, annex II.

5/ Ibid., annex I.

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